

**BE, SEM VII,
COMPUTER
(CBSGS)
MAY 2019**

(3 HOURS)

Total Marks: 80

N.B. (1) Question No 1 is compulsory

(2) Attempt any **three** Questions out of the remaining five questions

- Q1 (a) What are the differences between Hard computing and Soft Computing 5
 (b) How do you distinguish linearly separable for linearly non-separable patterns? 5
 (c) Define Extension principle with an example 5
 (d) What are the various Selection types used in Genetic Algorithms. Explain Roulette Wheel with an appropriate example 5
- Q2 (a) Compare the learning rules used for supervised and unsupervised and specify how the weight adjustments are done in each case 10
 (b) Use perceptron learning rule for computing weights after **one** iteration for the data given bellow 10
 $X_1=[1 \ 2 \ 0 \ -1]^T$; $X_2=[0 \ 1.5 \ -0.5 \ -1]^T$; $X_3=[-1 \ 1 \ 0.5 \ -1]^T$. Initial weight $W^1=[1 \ -1 \ 0 \ 0.5]$. The learning constant is given by $c=0.1$.
 The teacher's desired responses for X_1, X_2, X_3 are $[-1, -1, 1]$ respectively.
- Q3 (a) Design a fuzzy controller for controlling the amount of detergent required in a washing machine. The inputs are dirt and grease on clothes and the output is amount of detergent required. Use 3 descriptors for inputs and outputs respectively. Prove that clothes which have less dirt and grease requires less detergent and vice versa. Draw figures wherever required. 20
- Q4 (a) An engineer is testing the properties, strength and weight of steel. Suppose he has two fuzzy sets, A defined on universe of discourse $\{s_1, s_2, s_3\}$ and B defined on a universe of discourse $\{w_1, w_2, w_3\}$. The membership of A and B are given by $\mu_A=\{(s_1, 1), (s_2, 0.5), (s_3, 0.2)\}$ and $\mu_B=\{(w_1, 1), (w_2, 0.5), (w_3, 0.3)\}$
 a. Find the Cartesian product of A and B i.e $R=A \times B$
 b. Suppose $C=\{(s_1, 0.1), (s_2, 0.6), (s_3, 1)\}$. Find $S=C \times B$
 c. Find $C \circ R$ using Max-min composition
 d. Find $C \bullet R$ using max-product composition
 (b) How Learning Vector Quantization helps in classifying data samples? Write the algorithm of LVQ? 10
- Q5 (a) With a neat diagram explain the architecture of ANFIS? 8
 (b) Explain Steepest Descent Algorithm with a suitable example 8
 (c) State the differences between derivative based and derivative free optimization 4
- Q6 Write short notes on any **two**:-
 (a) Block Diagram of Error Back Propagation Training Algorithm(EBPTA) 10
 (b) Different membership functions of fuzzy logic 10
 (c) Major components of Genetic Algorithm 10

(3 hours)

Total Marks: 80

N.B. 1. Question No. 1 is compulsory

2. Attempt any **three** out of remaining

3. Assume suitable data if **necessary** and justify the assumptions

4. Figures to the **right** indicate full marks

- Q1 A Determine the energy of signal given by $x(n) = (1/4)^n u(n)$. 05
- B Compare microprocessor with digital signal processor. 05
- C Define BIBO Stable system. 05
- D Find the Linear Convolution of the following causal signals 05
 $x_1(n) = \{3, 2, 4, 1\}$ and $x_2(n) = \{2, 1, 3\}$.
- Q2 A Given $a[n] = \{1, 2, 3, 4\}$ using DFT properties 10
 (a) Find $A[k]$ which is DFT of $a[n]$
 (b) Let $b[n] = \{1, 4, 3, 2\}$ Find $B[k]$ which is DFT of $b[n]$ using $A[k]$.
 (c) Let $c[n] = \{2, 6, 6, 6\}$ Find $C[k]$ which is DFT of $c[n]$ using $A[k]$.
 (d) Let $d[n] = \{2, 1, 4, 3\}$ Find $D[k]$ which is DFT of $d[n]$ using $A[k]$.
- B Draw DIT FFT flow graph for 8-point sequence and compute DFT for causal 10
 sequence $x(n) = \{1, 2, 2, 1, 1, 2, 2, 1\}$.
- Q3 A Perform Cross correlation of the causal sequences 10
 $x(n) = \{3, 3, 1, 1\}$, $y(n) = \{3, 2, 1, 2\}$
- B Consider the following analog signal 10
 $x(t) = 5 \cos 2\pi(2000t) + 6 \cos 2\pi(4000t)$ to be sampled.
 I) Evaluate the Nyquist rate for this signal.
 II) If the signal is sampled at 6 kHz, will the signal be recovered from its samples?
- Q4 A Compute linear convolution of the causal sequences 10
 $x[n] = \{1, 2, 3, -1, 2, -2, 0, -1\}$ and $h[n] = \{-1, 2, 1\}$ using overlap save method.
- B For $x(n) = \{-2, 1, 2, -1, 6, 4, 5\}$, plot the following Discrete Time signals: 10
 1.) $x(n+2)$ 2.) $x(-n)u(-n+1)$ 3.) $x(-n-2)$
 4.) $x(n-1)u(n)$ 5.) $x(n+1)$

- Q5 A For the causal LTI digital filter with impulse response given by $h(n) = 2\delta(n) + 2\delta(n-1) + 2\delta(n-2) + 2\delta(n-3)$ sketch the magnitude response of the filter. 10
- B Check whether the system $y[n] = nx[n] + 2x[n-1]$ is: 10
- i) Static or Dynamic
 - ii) Linear or Non-linear
 - iii) Causal or Non-Casual
 - iv) Shift variant or Shift Invariant
- Q6 A Explain with the example significance of Carl's Correlation Coefficient Algorithm in digital signal processing. 10
- B Write a detailed note on DSP Processor. 10
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(3 hours)

Marks:[80]

N.B

1. Question No. 1 is compulsory.
2. Attempt any 3 out of remaining 5.

- Q.1 a) Explain the different software flaws with example. **05**
 b) Define goals of security and mechanism to achieve them. **05**
 c) Define the properties and applications of Hash function. **05**
 d) Explain handshake protocol in SSL. **05**
- Q.2 a) How is security achieved in Transport and Tunnel modes of IPSEC? Explain the role of AH and ESP. **10**
 b) How does PGP achieve confidentiality and authentication in emails? **10**
- Q.3 a) Why are digital certificates and signatures required? What is role of digital signature in digital certificates? Explain any one digital signature algorithm. **10**
 b) What are the different components of Intrusion Detection System? Compare signature based IDS to anomaly based IDS. **10**
- Q.4 a) Discuss DES with reference to following points **10**
 - Block size and key size
 - need of expansion permutation
 - role of S-box
 - weak keys and semi weak keys
 - possible attacks on DES
 b) Explain Diffie Hellman key exchange algorithm. What types of attacks are possible on it explain with example. **10**
- Q.5 a) Explain briefly the following attacks with example **10**

(I) Session hijacking	(II) Salami Attack
(III) SQL injection	(IV) Buffer overflow

 b) What is Denial of Service attack? What are the different ways in which an attacker can mount a DOS attack on a system? **10**
- Q.6 a) Explain the working of Kerberos. **10**
 b) Elaborate the steps of key generation using RSA algorithm. In RSA system the public key (E, N) of user A is defined as (7,187). Calculate $\Phi(N)$ and private key 'D'. What is the cipher text for M=10 using the public key. **10**